

Alexander C Swain's book

Nantucket

June 5th

Samuel Goodridge Fairfield

1837

Salem Mass

1837

Alexander C Swain's book June 5th

1837



ms. A. 1. 1
p. 119

May 1840

On the 29th of May I Charles & Giles were I
shipped on board the ship Charly Carroll of Vanuatu

On the 29th we weighed anchor and bound on a south
sea whaling voyage

On the 31st we saw a school of black fish we lowered away
our boats and killed 4 they made 16 barrels of oil

June 1840

June the 17th we made Fibres one of the Western Islands
we lay off and on getting recruits untill the 20th
we then left the Island and went cruising among the
group

July 1840

July the 18th we saw a large sperm whale we lowered
the boats and the bow boat struck him and killed him
he made 125 barrels of oil

On the 28th we put it on shore at Fayol one of the
same group we then left the Island and steered to the south

August 1840

On the 3rd we saw a school of whales we lowered a
the bow boat killed one he made 130 barrels

August 1840

On the 15th we passed the Isle of Cat and Bonaventure belonging to the cap de verde group.

September

On the 8th we saw a school of whales we lowered the larboard boat fastened to one and he struck her with his flukes and cut her in two the starboard boat fastened to one and killed him he made 15 bbls

October

On the 1st we were in at Rio De Janeiro in Brazil we landed 130 bbls of oil to be sent home we got a supply of water and on the 8th we weighed anchor and steered to the southward

On the 18th it was rough weather and the sea stove the bow boat

On the 21st we saw a school of right whales we lowered the boats but could not get any on the morning of the same day we saw a large sperm whale we lowered the boats and hunted until noon but could come up with him

November

On the 4th about 4 o'clock A.M. raised ^{up} Staten Land it lays in latitude 54.48 and longitude 63.42

On Monday the 9th we saw 28 icebergs

On Tuesday the 10th we saw one of the Diego Islands they lay in latitude 54.48 and longitude 63.42 we saw more of this ice every day for two weeks

we then steered to the northward along the coast of South America

December 1840.

On the 1st about 6 o'clock A.M. we saw the Island of Juan Fernandez it lay in latitude 33° 45' and long 79° 6' we also a whale ship on the weather ~~starboard~~ quarter about 10 o'clock she left off before the wind we tacked and stood that way and at one o'clock we both lowered our boat after a large whale we chased him four hours but could not come up with him we then spoke the said ship and it proved to be the Pacific of New Bedford capt Palmer 110 days out 120 bbls of sperm oil

On the 1st we spoke the ship Euphrates of New Bedford 95 months out 1400 bbls of sperm oil on the same day we spoke the ship Painter of Nantucket 30 months out 1400 bbls of sperm oil on the same day we also spoke the ship Metacomet of Nantucket 38 months out 1650 bbls of sperm oil On the 5th we spoke the ship Elizabeth Starbuck of Nantucket 36 months out 1600 bbls sperm oil

On the 30th we saw a school of black fish we lowered the boats and the bow boat struck one and the iron drawed and we lost him on the same day as one of the men fell overboard from the lee bow and the ship passed over him we lowered the starboard boat and saved him he being a good swimmer

January 1841

On the 4th and 5th we lowered for a school of black fish but we could not get any

On the 6th we lowered for a school of black fish the waste boat struck one and the iron drawed the bow boat struck one and saved him and the iron drawed he went about half a mile and died he made 5 bbls of oil

January 1841

On the 8th we raised a school of whales two points off our weather bow and about 6 miles off it being near sun down they were soon out of sight

On wednesday the 13th we raised Albemarle one of the Galapagos group it lay in latitude 0.50 and longitude 91.25

On the 15th we saw Charles Island one of the same group it lays in latitude 1.30 and longitude 91.33

On the 16th two boats went on shore to get turpentine we loaded the two boats

On the 17th two boats went on shore at Albemarle and loaded ~~the~~ with turpentine and four men belonging to the ship deserted

On the 18th we spoke the ship Richard Mitchell of Nantucket Captain Farmer 18 months out 250 bbls of sperm oil

On the 21st we spoke the ship Washington Captain Bayley of Nantucket 8 months 450 bbls sperm oil

On the 22nd we spoke the Ground Hallston of Salem Captain Rose 8 months out 450 bbls sperm oil on the same day we also spoke the ship Canton of New Bedford Captain Gary 26 months out 1900 bbls sperm oil on the same day we spoke ship Washington of Nantucket 8 months 450 bbls sperm oil

On the 28th we spoke the ships Washington the Richard Mitchell and the America 30 months out 2100 bbls of sperm oil

January 1841

On the 28 about 9 o'clock A.M. it came on to rain and lightning the lightning struck the main royal mast and split it in ten thousand pieces it also split the main & the gaff and mizzen mast and peeled off and done no more damage about half an hour after i was at the wheel a flash of lightning struck me & senseless and i remained so for about an hour when i came to. It done no more damage.

February

On tuesday the 2nd we lowered a sperm whale the larboard boat struck him and he wounded the waist board pulled up and bent on their line the whale run about two hours they lanced him and then cut the line the whale run about a quarter of a mile farther and then turned up he made 90 bbls of oil

On Friday the 5th we spoke the ship Kingston of Nantucket 8 months and 300 bbls sperm oil

On saturday the 6th we spoke the ship Mary of Nantucket 16 months and 600 bbls of sperm oil

On sunday the 7th about 5 o'clock P.M. we lowered for a sperm whale the waist board struck him and the one iron drawed and the other broke and we lost him

On tuesday the 9th we spoke the ship Young Hero of Nantucket Captain Dally 34 months and 2400 bbls of sperm oil

February 1851

On wednesday the 9th about one o'clock P.M.
one of our harpooneers a negro named Peter Sands
was fishing off the martingales and fell overboard
we cleared away and lowered the larboard boat but
unfortunately for him he could not swim and
before the boat got to him he sank and we saw
him no more in about an hour afterwards
we spoke the ship Richard Mitchell of
Nantucket

On thursday the 11th about 8 o'clock A.M.
we saw a school of sperm whales we lowered ~~one~~
the boat and the larboard boat fastened to one
and killed him he made 70 bbls of oil

On thursday the 18th we spoke the ship
Young Hero of Nantucket we also spoke the ship
Richard Mitchell of Nantucket Capt Garver

On saturday the 20th we spoke the ship
Magnolia of New Bedford Captain Barnard
27 months out 1550 bbls of sperm oil

On wednesday the 24th and 25th we saw a
school of whales we lowered the boat and
chased them all day but could not get any

March 12

On friday the 5th we spoke the ship
Alexander Baffin of Nantucket 6 months
out 700 bbls of sperm oil

March 1851

~~On the 5th we saw a school~~

On Friday the 12th about 5 o'clock P.M. we saw a school of sperm whales we lowered the boat and got two they both made 63 bbls of oil

On Tuesday the 17th we saw a school of whales we lowered the boat and got one he made 25 bbls of oil

On wednesday the 31st we saw a school of sperm whales we lowered the boat about 4 o'clock P.M. and about sun down the larboard boat struck one he ran to the windward of the ship the line got full at the loggerhead and capsized the boat it came on deck and the ship had sight of them and they remained so untill 1 o'clock the next day.

when we saw them from the mast head we lowered a boat and picked them up they were all nearly dead scarcely sufficient strength to stick to the boat but they all recovered in about a week

April

On monday the 5th we spoke the ship Jefferson of Charlestown 8 months old 180 bbls of sperm oil

On tuesday the 16th we saw a school of sperm whales we lowered the boat and the bow boat fastened to one and killed him he made 20 bbls of oil

On the 20th we saw a school of whales we lowered the boat and chased them but did not get any

April 1841

On Sunday the 21st we saw three of the
Marquesas Islands viz Pichanga, Oapo and off
Chevahoa it lays in Latitude 9° 41' and longitude 139° 2'
the three Islands are 80 miles from each other

On Monday the 22nd we anchored in Ported Bay
Chevahoa where we got wood water and other
necessaries this cruise was on the line from the
Galapagos islands to the Marquesas Islands

3 MARS

On Tuesday the 23rd we weighed anchor and worked
up to the northward and eastward

On Tuesday the 27th we saw a school of sperm whale
we lowered the boats and the larboard boat struck one
and killed him he made 1800 lbs of oil

On Wednesday the 28th we spoke the Barque Jane
of New Bedford 12 months out 35000 lbs sperm oil

On Thursday the 29th we spoke the ship Rose
of New Bedford 13 months out 12000 lbs sperm oil

3 APRIL

On Wednesday the 12th we saw a school of whale
we lowered and the larboard boat fastened to one
and the iron drawn the starboard boat fastened to
one and killed him he made 90 lbs of oil

On the 14th and 15th we spoke the ship Columbia
of New Bedford 25 months out 13700 lbs sperm oil

Sept 1841

On monday and tuesday the 19th and 20th we spoke.
The ship sprung a leak tuck'd 9 months out 250 bbls
of sperm oil

On saturday the 30th we saw a school of whales we
lowered the boats and the bow struck one and killed him
he made 31 bbls of oil

August

On monday the 1st we saw a school of whales we lowered
and the starboard boat fastened to one and killed him he
made 36 bbls of oil

On tuesday the 2nd we saw the same school all four boats
fastened and each one killed a whale the four whales
made 100 bbls of oil

On wednesday the 18th we saw a school of sperm whales
we lowered the boats and the larboard fastened to one and
killed him

the starboard boat struck one and one of the rows strained
and the other broke the bow boat struck him and fastened
to him and killed him the two whales made 44 bbls of oil

On saturday the 21st we spoke the ship ~~that~~ ~~had~~
Rudley Clark of Newport 8 months out 400 bbls
of sperm oil

September

On the 17th I fell overboard from the larboard
and went under the ship and came up after
they threw a rope to me from the ship and hauled
me on board

September 1861

On wednesday the 19th we saw a school of whales we lowered in the forenoon and got a small whale we then came on board of the ship and in the afternoon we lowered the boat again the bow boat fastened to a large whale and he struck the boat about amidships and cut her in two the captain went up and fastened to him and while he was lancing him he bit her in two and then chewed her to pieces the larboard fastened to him and killed him and the waist boat picked up the men there was not any one injured the two whales made 110. bbls of oil

On Thursday the 20th we spoke the ship Statira of Nantucket 21 months out 1900 bbls of sperm oil

On saturday the 27th we spoke the ship Splendid of Edgartown 19 months out 1600 bbls of sperm oil

On the 28th we spoke the ship Erie of Fairhaven 9 months out 407 bbls of sperm oil

On the 29th we saw a school of whales we lowered the boat and the starboard fastened to one and killed him they have a strong iron in another as he was passing by but did not kill him the larboard fastened to one and killed him the two whales made 54. bbls of oil

On Friday the 30th we spoke the ship Mariner of Nantucket 10 months out 250 bbls of sperm oil



October 1841

On the 1st we saw a school of whales we lowered the boats and got three on the 2nd we saw another school we lowered the boats and killed two the four made 50 bls of oil on the 2nd we spoke the ship Mary of Nantucket 24 months out 1000 bls of sperm oil

On sunday the 3rd we spoke the ship George Washington of Wareham Ms. 19 months out 450 bls of sperm oil

On monday the 4th we saw a school of sperm whales we lowered the boats and chased them but they were going to the windward and we could not catch them

On the 8th we lowered for a school of sperm whales but they were going so fast that we could not come up with them

On saturday the 9th we saw a school of sperm whales we lowered the boat the starboard the larboard and waist boat each got a whale the three whales made 60 bls of oil

On sunday the 10th we spoke the Barque Samuel Inde of London 16 months 900 bls of sperm oil

On saturday the 16th we saw a school of sperm whales we lowered the boats and the starboard fastened to one and killed him he made 22 bls of oil

On monday the 18th we saw a school of sperm whales we lowered but could not come up with them

On tuesday the 19th we saw a school of sperm whales we lowered and the larboard boat fastened to a large whale and killed him he made 85 bls of oil

On saturday the 23rd we spoke the ship George Washington of Wareham 19 months out 450 bls of sperm oil

October 1821

On tuesday the 26th we raised a school of sperm whales we lowered the boats and the larboard boat the starboard and the waist boat each got one the three whales made 77 barrels of oil.

On the 28th we saw a school of sperm whales we lowered the boats and the larboard boat struck one and one iron sprung and the other broke and we lost him the starboard boat struck one and killed him then threw a drug iron in another but the tail of the drug parted and the whale went off spouting thick blood the whale that the larboard got made 28 bbls of oil.

On fridday the 29th we picked up the starboard boats drugged whale he made 20 bbls of oil.

On saturday the 30th we lowered for a school of sperm whales but they perceived us and took to running to the windward and we could not catch them

November

On thursday the 4th we saw a school of whales we lowered the boats and the starboard boat struck one and killed him he made 20 bbls of oil.

On fridday the 5th we saw a school of sperm whales we lowered the boats and the larboard boat struck one and killed him he made 30 bbls of oil.

On sunday the 21st we raised a school of sperm whales we lowered the boats and the waist boat got one and the larboard boat got one the two whales the two whales made 50 bbls of oil.



November 23rd

On Tuesday the 23rd we saw a school of whales we lowered the boat and the starboard struck a large whale he went about 40 yards from the boat he then turned around and came full speed for the boat and struck her abreast the tub over where I sat I raised up as he struck the boat and fell over his head he hit the boat in two the irons drewed and we saw once afterwards he came up with the line that in this mouth we were in the water about an hour when the larboard boat came up and picked us up fortunately there was no body injured

On the afternoon of the same day we saw the same school of whales we lowered the boat and the larboard and starboard boat each got one the two whales made 53 lbs of oil

On wednesday the 24th we saw a school of whales we lowered the boat and the larboard boat fastened to one and killed him he made 32 lbs of oil

On saturday the 28th we saw a school of sperm whales we cleared away the boat and lowered for them and the starboard boat got three the larboard boat got one and the waist boat got two the six whales made 100 lbs of oil

This cruise was on the line from longitude 120 to 130



December 1841

On the 8th we made all sail and steered to the southward and westward for the Society Islands

On Tuesday the 11th we made Prince of Wales Island one of the Dangerous Archipelago group it lays in latitude 17° south and longitude 146° west in the afternoon of the same day as we was running along close to the land we saw a school of sperm whales within fifty yards of the shore we scared away and lowered the boat and the larboard and waist each got one the two whales made 50 bbls of oil

On the 15th at sundown we saw Otaheite one of the ~~islands~~ ^{part} of the Society Islands it lays in latitude 17° from longitude 149° 14'

On Thursday the 16th we took a pilot and went in and anchored we got wood water and other necessities and discharged 8 men that had shipped for the cruise we shipped two more men

January 1842

On Wednesday the 5th we weighed anchor and steered to the southward and eastward

On Tuesday the 20th we saw a school of whales we lowered the boat the starboard boat fastened to a large whale and killed him the larboard and waist boats each got a small one the three whales made 120 bbls of oil

On Friday the 30th we raised Pitcairn Island one of the ^{south} Society group it lays in latitude 25° 5' and longitude 130° 25' west

February

On the 1st we went on shore at Pitcairn Island and got potatoes and yams this the island is inhabited by 10 persons descendants of the mutineers of the ship Bounty

February 1842

On the 2nd we left Pteairine Island and stood to the eastward

On monday the 9th about 3 o'clock in the morning there came on a gale of wind from the northward we called all hands and took in all sail down to a close reefed main topsail which we lay too under untill the 11th about 9 o'clock in the forenoon when the gale abated and we made sail

March

On thursday the 24th we spoke the ship George Washington of Wareham 23 months out out 850 bbls of sperm oil

On friday the 25th we spoke the ship Charley of New Bedford 9 months out 400 bbls of sperm oil we also spoke the George Washington on the same day

April

On saturday the 2nd we spoke the Barque Equator of New Bedford Captain Fisher 80 months out 1100 bbls of sperm oil

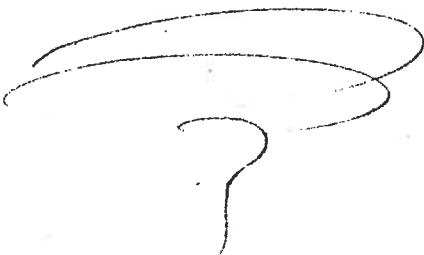
On thursday the 7 we saw a school of sperm whales we lowered the boats and the waist boat fastened to one and killed him he made 28 bbls of oil

May

On sunday the 1st we spoke the ship Washington of Nantucket 24 months out 800 bbls of sperm oil

On the 2nd we spoke the ship Mary of Nantucket 25 months out 1100 bbls of sperm oil

On the 3rd we spoke the ship Robert Edwards of New Bedford we also spoke the ship Mary of Nantucket on the same day



May 1862

On Thursday the 5th we saw Galapagos on of the
Galapagos Group this group lays from 2 north to 2 south
On Friday the 6th we spoke the ship Washington

On Wednesday the 18th we saw the town of Cherango
in Peru S. America we were then steering to the southward
along the land we spoke the ship Awashunes of
Falmouth Mass capt. S. was 23 months out 1150 bbls of
sperm oil

On Saturday the 21st we spoke the ship Calla Rock
of New Bedford Captain Reynolds 19 months out 1000 bbls
of sperm oil on the same day we saw a school of
whales in company with the said ship we both lowered
our boats and our larboard boat fastened to a large
whale and killed him he made 80 bbls of oil we gave the
said ship 40 bbls of it

On Wednesday the 25th we went in at Trujillo in Peru
this town lays in latitude 9 south we got wood water &c
and on the 5th of June we weighed anchor and steered
to the westward

June

On Tuesday the 9th we saw a schools of sperm whales
but they were a going to the windward in fact that we
did not lower

On Monday the 13th we raised Chatham Island ~~the~~
On Tuesday the 14th we saw Hood Island both belonging
to the Galapagos Group

On Friday the 15th we anchored at Chatham Island
we got about 200 two pin and on the 23 we weighed
anchor and steered to the westward

June 1842

On saturday the 26th we spoke the ship
Nantucket of Nantucket 12 months out
700 bbls of sperm oil we also spoke the ship
Minerva Smith of New Bedford on the same day

July

On saturday the 27th we spoke the Barque Bolton
of Stonington 25 months out 1000 bbls of sperm oil

August

On the 1st and 2nd we spoke the ship Erie of
Fairhaven 20 months out 600 bbls of sperm oil

On the 4th one of our men a native of Makaia
died after two months sickness of the consumption
On the same day at 7 past 12 we hauled aback the
main topsail and buried him.

On saturday the 12th we spoke ship Charles and Henry
of Nantucket 20 months out 350 bbls of sperm oil

On wednesday the 24th thursday the 25th and friday
the 26th we spoke the ship Cyrus of Nantucket
22 months out 1000 bbls of sperm oil

On Friday the 26th we saw a school of sperm whales
when we were in company with the Cyrus we lowered
our boats but we could not come up with them

September

On thursday the we saw a school of whales we
lowered the boats and the starboard and the larboard
boat each got one the two whales made 50 bbls of oil

On sunday the 4th we spoke the Brig Sarah Maria
93 days from Boston bound to the Sandwich Islands
with a cargo of machinery

September 1842

On Friday the 9th we saw a school of sperm whales we lowered the boats and the larboard fastened to one and the irons drawed and the waist boat chased him and fastened to him and killed him he made 35 bbls of oil

On Friday the 19th we spoke the ship Erie of Fairhaven on the same day we also spoke the ship Samuel Robinson of New Bedford 11 months out 300 bbls of sperm oil

On Monday the 25th we spoke the ship Adeline Gibbs of Nantucket 13 months 500 bbls of sperm oil

October

On Tuesday the 6th and Wednesday the 7th we spoke the ship Rose of New Bedford 30 months out 2300 bbls of sperm oil

On Thursday the 15th we spoke the ship Christopher Mitchell of Nantucket 11 months out 450 bbls of sperm oil

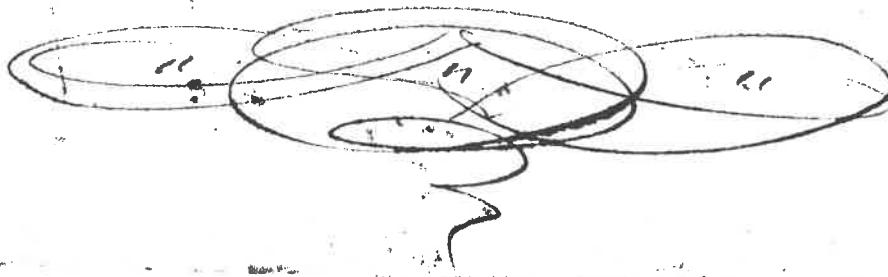
On Friday the 16th we saw a school of sperm whales we lowered the boat and the starboard fastened to one and killed him he made 25 bbls of oil

On Monday the 19th we saw a school of sperm whales we lowered the boats and the waist boat fastened to one and killed him he made 20 bbls of oil

On Monday the 26th we saw a school of sperm whales we lowered the boats and chased them until sundown but did not get any

November

On Tuesday the 1st we saw a school of sperm whales we lowered the boat about 5 o'clock P.M. and the larboard and the waist boats each got one the two whales made 30 bbls of oil



November 1842

On saturday the 12th we saw a school of sperm whales about 10 o'clock ~~at~~ A.M. we lowered the boat the larboard boat fastened to one and killed him and the boat came on board the ship again we chased the whales with the ship and about 2 o'clock we got near enough and lowered the boat again and the starboard boat struck one and killed him the larboard boat struck one and the iron strap parted and we lost him the starboard boat struck one and killed him he made 50 bbls of oil.

On tuesday the 15th we saw a school of sperm whales ~~at~~ we chased them with the ship but could not get near enough to lower.

On friday the 18th we saw a school of sperm whales we lowered the boats and the larboard boat struck one and the iron strap parted and we lost him the starboard boat struck one and killed him he made 20 bbls of oil.

On friday the 25th we spoke the ship Champion of Edgartown 11 months out 800 bbls of sperm oil

On saturday the 26th we saw a school of sperm whales off the sea quarter we lowered the boat and the larboard boat struck one and killed him he made 25 bbls of oil

On monday the 28th we made sail and steered S.S. ~~W~~ for the Marquesas Islands

December

On monday the 4th about 10 o'clock ^{at} we saw Woods Island about 11 o'clock we saw Dominica in a little while after we saw Magdalena all belonging to the Marquesas group Woods Island lies in Latitude 9° 26' and longitude 138° 52' Dominica lies in Latitude 8° 56' and longitude 139° West Magdalena lies in Latitude 10° 25' and longitude 138° 49' West

we lay off and on at Dominica trading for hogs fruit &c until friday the 9th we then steered for Chebarkoo or Newburgh one of the same group this Island lies in Latitude 9° 11' South and longitude 139° 2' West This cruise ~~at~~ was on the Equator in Longitude from 125° to 135°



December 1842

On saturday the 10th we took a pilot and went in at Chevahoa we got a supply of wood water potatoes fruit etc and on the 26th we weighed anchor and again started for Dominica which we made on the 28th we lay off and on ad Dominica trading until January the 1st we then started to the northward for the Equator

January 1843

On Friday the 6th we spoke the Ship Christopher Mitchell of Nantucket 13 months out 100 bbls of sperm oil

On Monday the 9th we spoke the Ship United States of Nantucket Captain Worth 12 months out 600 bbls of sperm oil

February

On Wednesday the 2nd about 10 o'clock A.M. we saw a school of sperm whales on the le beam we squared away and run for them and about one o'clock we got near enough and lowered the boats and the starboard boat fastened to one and a small calf came up under the boat and capsized her and the line got foul around the hammerhead and parted and we lost the whale the boat was but slightly injured

On Thursday the 10th we saw a school of sperm whales we lowered the boat and the starboard and port bow each got one the two whales made 50 bbls of oil

On Friday the 11th we saw a school of sperm whales and about 1 o'clock P.M. we lowered the boat but they saw the ship and we could not come up with them

March

On the 2nd about half past 6 P.M. we saw the comet we was then on the Equator in longitide 133 west and the comet bore N. 25. 11.

On Friday and saturday the 3rd and 4th we spoke the Ship Montalvo of Nantucket 15 months out 350 bbls of sperm oil on the 4th we also spoke the Ship Foster of New Bedford 17 months out 450 bbls of sperm oil

MARCH 1848

On Monday the 6th about 2 o'clock P.M. we saw a school of sperm whales in company with the ship Montaymo we both lowered our boats and chased them until wind down but could not overhauled them on the same evening we spoke the Montaymo

On wednesday the 8th we saw a school of sperm whales we lowered the boat and the starboard and waist boat each got one the two whales made 10 bbls of oil
about 2 o'clock P.M. of the same day we lowered the boat for the same school of whales and the starboard boat fastened to one and killed him he made 22 bbls of oil

On Friday the 10th we saw a school of sperm whales about 5 miles off the weather beam we lowered the boat and pulled up to them and the starboard boat killed 3 and the starboard boat got 1 the starboard boat while fast to a whale lanced a large whale as he was passing by and the ship Montaymo got him the 4 whales made 70 bbls of oil

On Sunday the 12th we spoke the ship Montaymo with 450 bbls of sperm oil

On Sunday the 19th about one o'clock P.M. we saw a school of sperm whales we lowered the boat and the starboard and waist boat each got one the two whales made 70 bbls of oil

On Tuesday the 21st we saw a school of sperm whales we lowered the boat about 2 o'clock P.M. and the starboard boat got a poor one and the waist boat got her only the two whales made 20 bbls of oil

On Saturday the 26th we spoke the ship Montaymo of
abandoned 15 months out four hundred and fifty
barrels of sperm oil

April 1843

On saturday the 1st we spoke the ship of war the of
New Bedford 32 months out 1600 bbls of speron oil

On sunday the 2nd about 9 o'clock A.M. we saw a school
of sperm whalys we lowered the boat and the larboard boat
struck a small calf the starboard boat pulled up and struck
a cow then the waist boat pulled up and struck another cow
and killed him the larboard cut from the calf and struck a cow
and the line parted and they lost him the starboard boat to line
parted and they lost him the larboard boat struck the calf again
and killed him the two whalys made 25 bbls of oil

On monday the 3rd we saw a school of sperm whalys 2 points
on our weather bow and about 3 miles off but they were going
to the windward so fast that we soon lost sight of them

On friday the 7th about 9 o'clock P.M. we saw a school of sperm
whalys on the starboard and about 3 miles off we lowered the boats
and chased them but they were soon out of sight and we came
on board again and square away and run untill 10 o'clock P.M.
when we saw them again we lowered the boat again and the
waist boat fastened to one and killed him he made 25 bbls
of oil

On monday the 9th about one o'clock A.M. we saw a school
of sperm whalys we lowered the boat and the starboard boat
struck one and the iron drawed the waist boat went alongside
of one and the harpooner threw an iron against him and it bent
double and would not go in on account of the skin being thick
we chased them untill night and could not get any

On saturday the 14th about 6 o'clock A.M. we saw a school of sperm
whalys four points on the weather bow and about 4 miles off we
lowered the boats and the starboard boat fastened to one and killed him
he made 25 bbls of oil

On sunday the 23rd we left the Equator and started to the southward
for the Marques Islands

On sunday the 30th we saw Pohoga one of the Marques Islands
it lay in latitude 9° south and longitude 140° west

May 1843

On monday the 1st we saw Hoods Island, Cope and Ohevahoa all belonging to the Marques group. Hoods Island lay in ^{Lat} 9° 26' and ^{Long} 138° 52' Cope lay in ^{Lat} 9° 30' and ^{Long} 138° 36' West Ohevahoa lay in ^{Lat} 9° 45' South and ^{Long} 139° 2' West

On Tuesday the 2nd we took a boat and went in at Ohevahoa and anchored we got wood water hogs fruit and other necessaries.

This cruise was on the Equator in ^{Lat} 9° 45' ^{Long} 138° to 139°

On

June

On wednesday the 6th we weighed anchor and steered to the Westward

On Thursday the 7th we made Robert D. Blair this Island is uninhabited we took a boat and went on shore and caught a boat load of fish we cruised around the island and still finding the no men left it and steered to the southward and westward this Island lay in ^{Lat} 8° 24' South and ^{Long} 140° 48' West

On saturday the 17th about 2 o'clock P.M. we saw a school of whales 1 point on the lee bow and about 2 miles off we lowered the boat and the starboard boat fastened to one and the larboard boat fastened to the same whale and killed him he made 30 bbls of oil

On Tuesday the 20th we caught a shark 11 feet long

On saturday the 24th we made Deans Island one of the Dangerous Archipelago Group it lay in ^{Lat} 14° 58' South and ^{Long} 117° 50' West the wind was blowing from the westward and we beat to the windward and on Monday the 26 we passed through the passage between this Island and Lagoon Island which about 4 miles to the westward of Deans Island after getting through the passage we steered S. W.

On Tuesday the 27th about 5 o'clock A.M. we raised Martha this also belongs to the Dangerous Archipelago Group it lays in ^{Lat} 16° 16' South and ^{Long} 148° West

June 1848

On Friday the 29th we spoke the schooner Sarah of Ann
of Harwich in Europe she was two days from the Society Islands
she was bound to the Chain Islands trading for cocoanut oil

On the same day we saw Paro Island this Island lays about 40
miles distant from Oahu it belongs to the Society Group.

July 1848

On Monday the 3rd took a pilot and went in at Oahu
on of the Society we first anchored in Towna harbour on
Tuesday the 11th we weighed anchor and sailed the ship
through Towna passage into the Oaitapeka bay which
is about 3 miles distant we propeled 1800 bbls of oil and got
wood water fruit and other necessaries and took six passengers
two of which we took from the bonans hands sick to take to the
U.S. with us this Island lays in latitude 17.29 in longitude 149.14 1/2

August

On Monday the 7th we weighed anchor and sailed to the
southward and eastward bound to Nantucket from whence
we came

On Wednesday the 16th Paro Island one of the Society Group

On Friday the 18th about 6 o'clock P.M. we tried the pumps and found
considerable water in her we pumped and it was four hours before
we could get her free the first done of any consequence before the
whole voyage it was owing to heavy weather and carrying a heavy
load of oil

September

On Wednesday the 2nd we saw a school of whale it being very
heavy weather we did not stop for them

On Thursday the 5th there came on a gale from the eastward about
6 o'clock P.M. and all hands were called to take in sail we took
all sail except a closed reefed main top sail and fore topmast stay
sail which we lay too under until Saturday the 10th about
6 o'clock P.M. when the gale abated and we made all sail again
the ship was still leaking 500 strokes an hour

September 1873

On monday the 11th about one o'clock in the morning it began to blow again from the westward all hands were called and we took in sail down to a close reefed main topsail which we sailed under until 9 o'clock the same day when the gale abated and we made all sail again this was in latitude 51 south and longitude 95 west

On Thursday the 14th about 10 o'clock A.M. we saw a barge steaming to the northward she showed American colours and passed about 6 m. to the eastward of us

About 1 o'clock on the same day we saw a brig standing to the northward she showed English colours we set our signal and she got hers she being an English vessel we could not read her signal we were then in Latitude 55.10 south and Longitude 85.20 west and steaming S by E N half E

On wednesday the 20th we was off Cape Horn in latitude 55.58 south and longitude 67.21 west on the same day we shifted our course from S. E. by E. N. E. by N.

On Thursday the 21st a P.M. we saw a barge she showed American colours and passed about 3 miles to the eastward of us she was steaming about S. E. by E.

On Friday the 22nd about 4 o'clock P.M. we saw Staten Land we passed about 40 miles to the westward of it the Island lies in latitude 54.48 south and longitude 63.12 west we was then steaming S. E. by E.

On saturday the 23rd we saw a sail when we hauled the main yard aback and lay too for her she came up and spoke us and it proved to be the ship Rocharonka of Tisbury 39 months out 1300 bbls of sperm oil she sailed from Boston two days before we did bound home she was in company with us until monday the 25th about 10 o'clock in the evening when there came on a furious gale we were under a close reefed main topsail until the next night when we took in the main topsail and set the main topsail and fore topmast staysail and lay too until Thursday the 28 when it abated and we made all sail again

November 1843

On Tuesday the 20th about 6 o'clock P.M. we were going with studding sails out low and aloft with the wind from the southward it began to blow and we took in sail down to a close reefed main topsail and fore topmast staysail which we lay too under until 7 o'clock P.M. on the 21st when it began to abate gradually the wind shifted from south to west and we made all sail again

On Thursday the 22nd we saw a brig she was steaming East on a luff about a mile to the windward of us and showed American colours

About nine o'clock on the 23rd we saw a brig on our lee beam bearing to the eastward we was then steaming N.W. in Latitude 28° 57' and Longitude 56° 30' West

On Tuesday the 27th about noon it began to blow from the northward and we double reefed the topsails it continued blowing until wednesday about 6 o'clock when it abated and we made all sail again the wind still blowing from the northward

On wednesday the 28th about 10 o'clock A.M. we saw a Brigantine one point on our lee bow and about 10 miles off she was steaming to the southward and westward and showed English colours we was then in Latitude 32° 24' North and Longitude 69° West

On Thursday the 29th about one o'clock in the morning the wind shifted from E to S.W.

on the same day we were put on short allowance we being short of provisions and water

On the same day about 4 o'clock P.M. we saw a ship three points on our lee bow she was steaming west and were steaming e North we crossed her bows about a mile off we was at this time in latitude 33° 20' North and Longitude 70° 30' West

November 1843

On Thursday the 29th about 7 o'clock P.M. we was
N by W with a fine breeze from the S. off it began to
increase untill it got to a heavy gale we took in
all sail except a close reefed main topsail and fore sail
about 11 o'clock the wind shifted to West and still
continued blowing untill about 4 o'clock in the morning
when it shifted to N.W. W. and it then began to
abate and we began to make sail again we was then
about off Cape Hatteras

On Thursday the 30th about 6 o'clock P.M. we saw
a ship on our bow and about 10 miles off standing to the
westward we was then steering the same way with the
wind from the Northward

December

On the 1st about 1 o'clock in the morning the wind
shifted from North to West we set studding sails fore
and aft and carried them untill 10 o'clock A.M. when
it blew so hard that we began to take in sail we was
steering a N.E. by N.

At 4 o'clock P.M. it blew so hard that we took in all sail
except the fore topmast staysail which we lay too under
untill 8 o'clock P.M. when it abated and we made sail
up to double reefed topsails which we run under it
still blowing a fresh at gale

On saturday the 2nd at 2 P.M. we saw a schooner on our lee
beam headed to the Eastward laying too at 3 o'clock P.M. we saw
a brig on our leeward beam and a ship on our weather beam they
were about 10 miles apart and both laying too much about
sail we passed between them

September 1813

On tuesday the 26th while laying too in the said gale the sea was so heavy the and the ship rolled so that she rolled the starboard boat under and stove her to pieces we was then in latitude 50 south and longitude 51 west. The wind from the S. E.

October

On monday the 16th we saw a ship on our larboard quarter and steering to the southward and eastward she run acrossed our stern about 8 miles distant she looked like an armed vessel

On tuesday the 17th we saw a brigantine on our starboard bow and steering to the eastward sharp on the wind we was then in Latitude 24 south with the wind from the northward

On wednesday the 18 we saw a sail standing to the westward on the starboard tack doubtless the same vessel we saw on the 17th

On thursday the 19th we spoke the barque Endeavour of New Bedford 25 days out 20 bbls of sperm oil she was bound around the Cape of Good hope on the same day we took the south east trades

On Friday the 20th we saw a ship and two brigs the ship was standing to the northward and the two brigs was standing to the southward we was at this time steering North in Latitude 20° 28' and Longitude 29° 5' West

On tuesday the 21st we saw a Brig and a schooner they was steering about S. E. and they shewed American colours

On wednesday the 22nd we saw a ship she was steering south she shewed American colours



October 1843

On sundays the 29th we passed the Island of Ferdinand Noronha on the east coast of South America it lays in Latitude 8.53 and longitude 32.27^o West

On monday the 30th we crossed the Equator in Longitude 36.67^o West we were then steering S.W. by E.

November

On monday the 6th about 9 o'clock in the evening there came on a squall and carried away a fore topmast studding sail boom.

On the night of Friday 10th we carried away another fore topmast studding sail boom

On the 11th about sun down we were steering S.W. by E. with studding sails out low and aloft there came on a gale of wind from the eastward we took in all sail down to a close reefed main topsail and stood until daylight the next morning when we made all sail again

On the 14th we saw an English brig she crossed our bows about 2 miles off she was steering about west suppose she was bound to the West Indies on the same day we took down the tryworks and threw them overboard we were at this time steering S.W.

On Sunday the 18th about 4 o'clock P.M. we saw a Brig she showed English colours and passed about 2 miles to the leward of us she was steering to the southward and westward sharp on the wind

On Tuesday the 20th we saw a barge she passed about a mile to the leward of us steering to the eastward we were steering S.W. by E. with the wind from the southward

December 1843

We were then under double reefed topsails with the wind N.E. standing on the starboard tack. On the same evening at 12 o'clock we threw the deep sea lead but got no bottom at 5 m. in the morning we threw the lead but got no sounding.

On Sunday the 3rd about 2 P.M. the wind shifted from N.E. to North we tacked and stood on the starboard tack the wind moderated and we made all sail again.

On Monday the 4th about 8 o'clock A.M. we saw a schooner about 10 miles astern at 9 o'clock A.M. the wind shifted from N.E. to S.E. we then steered N.E. by N. at one o'clock P.M. we saw a brig on the larboard beam she was steering about east we were at this time in Latitude 38° 58' N and Longitude 71° 40' West on the same night at 12 o'clock we threw the deep sea lead and got soundings 45 fathoms and white sandy bottom at 5 o'clock the next morning we threw the lead and got soundings 30 fathoms and black and white sandy bottom.

On Tuesday the 5th at 8 o'clock A.M. we raised Block Island right ahead at 10 o'clock we took a Pilot from Block Island about 7 o'clock in the evening of the same day we anchored in Tisbury harbour Martha's Vineyard.

On Wednesday the 6th about 8 o'clock A.M. we weighed anchor and made sail for Edgartown on the same Island distance 30 miles about 12 o'clock the same day we let go the anchor and warped along side of the wharf.

On the 10th we began to hoist out the cargo.

On the 15th got the cargo hoisted out and sent down the small boats.



December 1843

On Tuesday the 19th about 8 o'clock P.M. the
steam boat Massachusetts hove in to tow the ship to
Nantucket about 9¹/₂ P.M. ship struck on Nantucket
shoal the steam boat left her and proceeded to
Nantucket to wait for the tide to raise

at bout 9 o'clock the same evening the steam boat came
and hove in to us and about midnight we got along side
of Nantucket wharf this will a long and disagreeable
voyage of 41 months and 20 days, in which time we
got 86 whales which yielded 2200 bbls of oil

Charles S. Gilbreath

PART I.
The inclination of two lines meeting

fig. 1st.

one another, or the opening between them, is called an angle.

If the right line CD, fig. 2, fall upon another right line AB, so as to incline to neither side, but make the angles on each side equal, then these angles are called right angles and the line CD is said to be perpendicular to the other line.

fig. 2.

An obtuse angle is greater than a right angle; as $\angle A$, fig. 3.

fig. 3.

An acute angle is less than a right angle; as $\angle B$, fig. 3.

et

D

A circle is a round figure bounded by a single line, in every part equally distant from the same point, which is called the centre. fig. 4th.

fig. 4th.

The circumference or periphery of a circle is the bounding line; as AB , fig. 4th.

fig. 4th.

The radius of a circle is a line

drawn from the centre to the circumference; as OB , fig. 4th. Therefore all radii of the same circle are equal.

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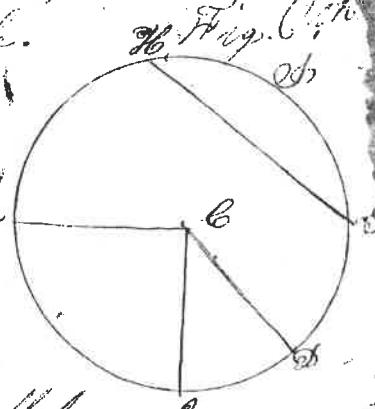
arc of a circle is any part of the circumference, as B C or H G, Fig. 5th, and is said to be an arc of as many degrees as it contains of the parts of the whole circle.

A chord is a line drawn from

one end of an arc to the other, and is the measure of the arc; H G is the chord of the arc H G B, Fig. 6th.

The segment of a circle is a part of a circle cut off by a chord; thus the space comprehended between the arc H G B and the chord H G is a segment, Fig. 6th.

A sector of a circle is a space contained between two radii and an arc less than a semicircle; as B C D or A C D, Fig. 6th.



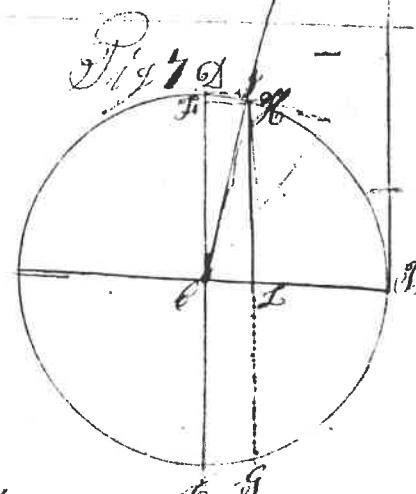
The sine of an arc is a line drawn from one end of the arc, perpendicular to the radius or diameter drawn through the other end; or it is half the cord of double of the arc; thus H L is the sine of the arc H B, Fig. 7th.

The sines of the same diameter increase in length till they come to the centre, and so become radii, after which they diminish. Hence, it is plain that the sine of 90 degrees is the greatest possible size, and is equal to the radius.

The versed sine of an arc is that part of the diameter or radius which is between the sine and the circumference; thus L B is the versed sine of H B, Fig. 7.

The tangent of an arc is a right line touching the circumference, and drawn perpendicular to the parameter; and is terminated by a line drawn from the centre through the other end of the arc; thus B H is the tangent of the arc B H, Fig. 7.

The secant is a line drawn from the centre through one of the arc till it meets the tangent; thus O H is the secant of the arc B H, Fig. 7.



The complement of an arc is what the arc wants of 90° , or a quadrant; thus AC is the complement of the arc BC . Fig. 7.

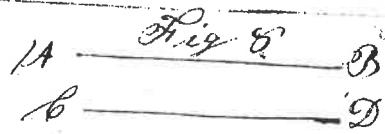
The supplement of an arc is what an arc wants of 180° degrees, or a semicircle; thus AD is the supplement of the arc BC . Fig. 7.

The sine, tangent or secant of the complement of any arc is called the cosine, cotangent, or cosecant of the arc; thus, AB is the sine, CD the tangent, and CE the secant of the arc BC ; or they are the cosine, cotangent, and cosecant of the arc AB . Fig. 7.

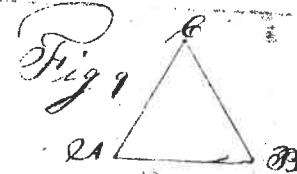
The measure of an angle is the arc of a circle contained between the two lines which form the angle, the angular point being the centre; thus, the angle ABC . Fig. 7. is measured by the arc AB ; and is said to contain as many degrees as the arc does.

The sine, tangent, or secant of an arc is also the sine, tangent, or secant of the angle whose measure the arc is.

Parallel lines are such as are equally distant from each other; as AB and CD . Fig. 8.

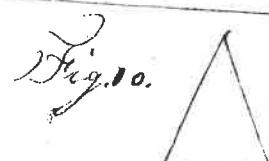


A triangle is a figure bounded by three lines; as at ABC . Fig. 9.



An equilateral triangle has its three sides equal in length to each other. Fig. 9.

An isosceles triangle has two of its sides equal. Fig. 10.



A scalene triangle has three unequal sides. Fig. 11.



A right angle triangle has one right angle in it. Fig. 12.



An obtuse angled triangle has one obtuse angle. Fig. 13.

An acute angled triangle has all its angles acute. Fig. 9. or 10.



Acute and obtuse angled triangles, are called oblique angled triangles, or simply oblique triangles; in which the lower side is generally called the base, and the other two, legs.

In a right angled triangle the longest side is called the hypotenuse, and the other two, legs, or base and perpendicular.

The perpendicular height of a triangle is a line drawn from one of the angles

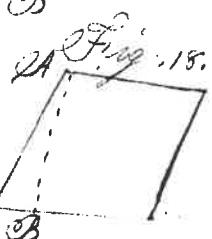
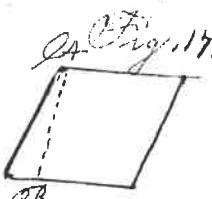
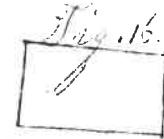
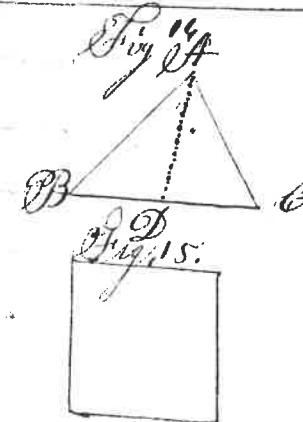
perpendicular to its opposite side; thus, the dotted line of D. Fig. 14. is the perpendicular height of the triangle A B C.

A square is a figure bounded by four equal sides, and containing four right angles. Fig. 15.

A parallelogram, or oblong square, is a figure bounded by four lines, the opposite ones being equal and the angles. Fig. 16.

A rhombus is a figure bounded by four equal sides, but has its angles oblique. Fig. 17.

A rhomboid is a figure bounded by four sides, the opposite ones being equal, but the angles oblique. Fig. 18.

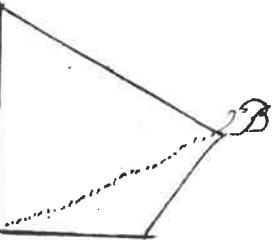
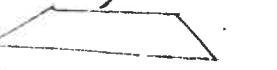
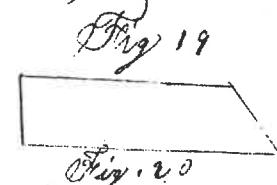


The perpendicular height of a rhombus or a rhomboid, is a line drawn from one of the angles to its opposite side; thus, the dotted lines A B. Fig. 17 and 18, represent the perpendicular heights of those figures.

A trapezoid is a figure bounded by four sides, two of which are parallel though of unequal length. Fig. 19 and Fig. 20.

A trapezium is a figure bounded by four unequal sides. Fig. 21.

A diagonal is a line drawn between two opposite angles; as the line A B. Fig. 21. A



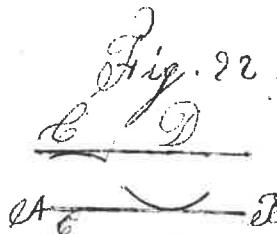
Figures which consist of more than sides are called polygons; if the sides are equal to each other they are called regular polygons, and are sometimes named from the number of their sides, as pentagons, or hexagons, a figure of five or six sides, &c.; if the sides are unequal, they are called irregular polygons.

Mr Eliz Anna Bowe

PART III.

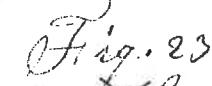
Problem 1st

To draw a line parallel to another line at a given distance; as at the point D, to make a line parallel to the line A B, Figure.



Problem 11.

To bisect a given line; or, to find the middle of it. Fig. 23



Project Problem III.

8. erect a perpendicular from the end, or any part of a given line. Fig. 84



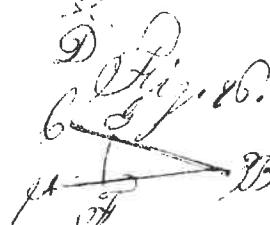
Problem IV.

Problem IV.
From a given point, as at C,
to drop a perpendicular on a
given line ABC. Fig. 25.



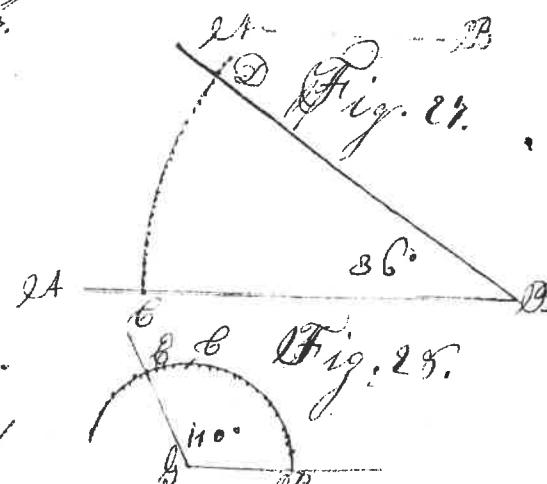
Problem V

Smoker's angle at C



Problem VI.

Problem VI.
To make an acute angle equal to a given
number of degrees, suppose 36. Fig. 27.

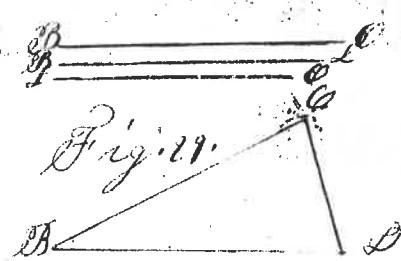


Problems VI

Problem VII
To make an obtuse angle, suppose of
110 degrees. Fig. 28.

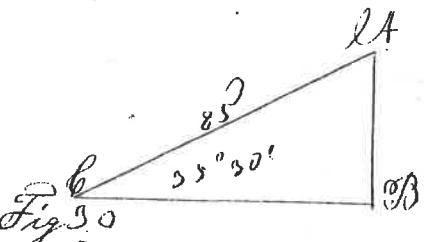
Problem VIII.

To make a triangle of three given lines, as BC , BD , DC . Fig. 28.



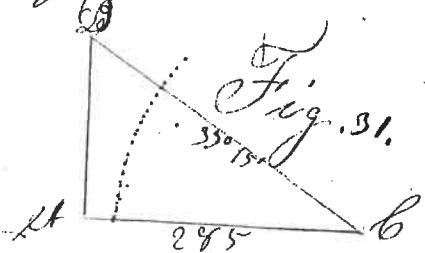
Problem IX.

To make a right angled triangle, the hypotenuse and angles being given. Fig. 29.



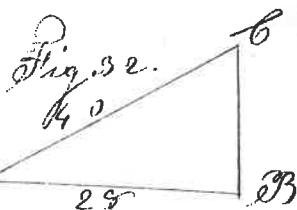
Problem X.

To make a right angled triangle, the angles and one leg being given.



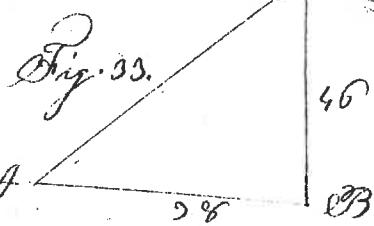
Problem XI.

To make a right angled triangle, the hypotenuse and one leg being given. Fig. 30.



Problem XII.

To make a right angled triangle, the two legs being given. Fig. 31. 24



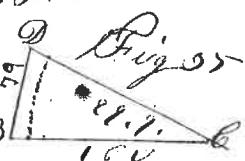
Problem XIII.

To make an oblique angled triangle, the angles and one side being given.



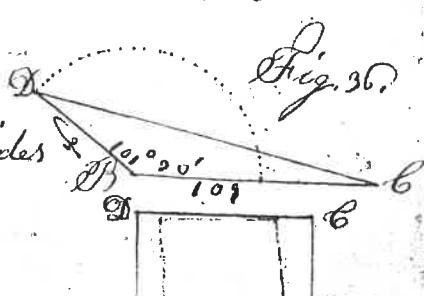
Problem XIV.

To make an oblique angled triangle, two sides and an angle opposite to one of them being given. Fig. 34.



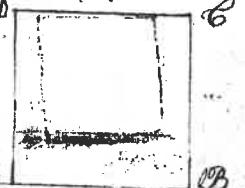
Problem XV.

To make an oblique angled triangle, two sides and their contained angle being given.



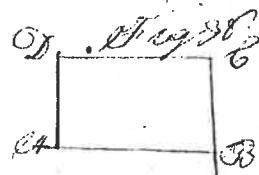
Problem XVI.

To make a square. Fig. 37.



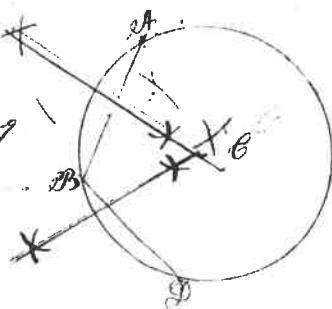
Problem XVII.

To make a rectangle; Fig. 38.



Problem XVIII.

To describe a circle which shall pass through any three given points, not lying in a right line, as A, B, C, Fig. 39.



Problem xix.

To find the centre of a circle.

Trigonometry.

Proposition I.

If one leg, AB , Fig. 40, be right angled.

the triangle, as $A B C$, Fig. 40, it is

perpendicular from B to AC , compared with the

Geometrical definitions to which that

Fig. 40 refers, that if the hypotenuse AC

AC be made radius, and with it an arc

of a circle be described from each end,

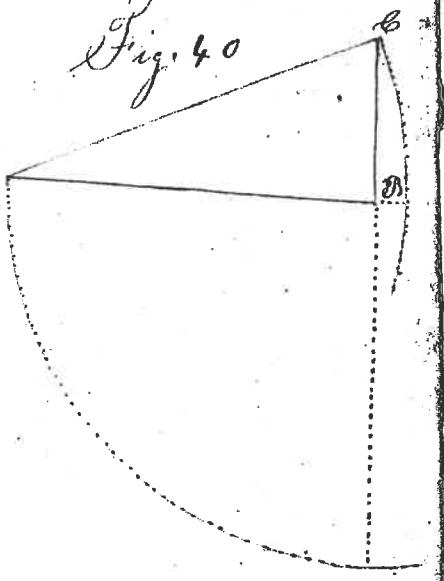
BC will be the sine of the angle at A ,

and AB the sine of the angle at C ;

that is, the legs will be sines of their

opposite angles.

Fig. 40



Proposition II.

If one leg, AB , Fig. 41, be made radius, and with

it on the point A an arc be described, then

BC , the other leg, will be the tangent,

and AC the secant of the angle at A ;

and if BC be made radius, and an arc

be described with it on the point B , then

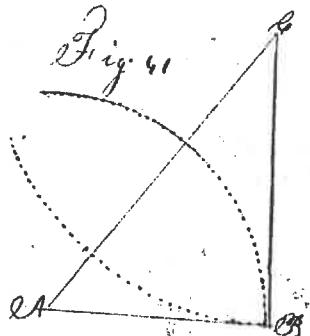
AB will be the tangent and AC the secant

of the angle at B ; that is, if one leg

be made radius the other leg will be a tangent of its opposite

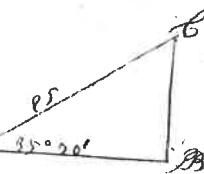
angle, and the hypotenuse a secant of the same angle.

Fig. 41



Case I.

The angles and hypotenuse given to find the legs. Fig. 42.



Marking the hypotenuse as radius, the proportions will be;

To find the leg AB .

the radius.

Hyp. AC , 25

: sine ACB , $34^{\circ}30'$

leg AB , 2.62 nearly

To find the leg BC .

the radius.

Hyp. AC , 25

: sine ACB , $35^{\circ}30'$

leg BC , 14.52 nearly

1.0000000

1.3758400

9.4629364

11.1618750

10.0000000

1.1618750

Trigonometry

Making the leg AB radius, the proportions will be:

To find the leg AB .

$$\text{At secant } \angle ABB, 35^\circ 30' - 20' = 10.089384$$

$$\text{hyp. } AB, 25' - - - - - 1.022940$$

$$\text{radius} - - - - - 1.00000000$$

$$\text{leg } AB, 20.35' - - - - - 1.008666$$

To find the leg BC .

$$\text{At secant } \angle ABB, 35^\circ 30' - 10.089384$$

$$\text{hyp. } BC, 25' - - - - - 1.022940$$

$$\therefore \text{tangent, } \angle ABB, 35^\circ 30' - 9.853267$$

$$\therefore \text{leg } BC, 14.50' - - - - - 1.0251605$$

Making the leg BC radius, the proportions will be:

To find the leg AB .

$$\text{At secant } \angle ABB, 35^\circ 30' - 10.236046$$

$$\text{hyp. } AB, 25' - - - - - 1.022940$$

$$\therefore \text{tangent, } \angle ABB, 35^\circ 30' - 10.166730$$

$$\therefore \text{leg } AB, 20.35' - - - - - 1.0254637$$

To find the leg BC .

$$\text{At secant } \angle ABB, 35^\circ 30' - 10.236046$$

$$\text{hyp. } BC, 25' - - - - - 1.022940$$

$$\therefore \text{radius} - - - - - 1.00000000$$

$$\therefore \text{leg } BC, 14.50' - - - - - 1.0254637$$

By Natural sines

This case may be solved by natural sines, according to the following proportions:

1. unity or, is to the length of the hypotenuse,
as is the natural sine of the smallest angle, to the
length of the ~~shortest~~ shortest leg. Or, is the natural
sine of the largest angle, to the length of the
longest leg.

Or which is the same thing, multiply the natural sines
of the angles by the hypotenuse: the products
will be the lengths of the two legs.

$$\text{Nat. sine of } 35^\circ 30'$$

$$0.58010$$

25

Hyp.

$$\begin{array}{r} 2.90270 \\ 1.16140 \\ \hline 1.741550 \end{array}$$

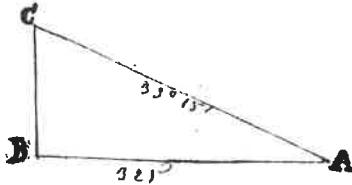
$$\text{leg } BC, 14.50$$

$$\text{Nat. sine of } 54^\circ 30'$$

$$\begin{array}{r} 0.81412 \\ \hline \text{hyp } 25' \\ 4.04060 \\ 1.69384 \\ \hline 2.35900 \end{array}$$

$$\text{leg } AB, 20.35$$

base II.
The angles and one leg. given to find the
hypotenuse and the other leg. Fig. 43.



Making the given leg radius, the proportions will be:

To find the hypotenuse

as radius.

$$\text{leg } AB, 3.68$$

$$\text{sec } \angle ABB, 35^\circ 30'$$

$$\text{hyp. } 0.8856$$

To find the leg BC .

At radius

$$\text{leg } AB, 3.68$$

$$\text{tangent } \angle ABB, 35^\circ 30'$$

$$\text{leg } BC, 21.31$$

Trigonometry.

Making the hypotenuse radius, the proportion to find the angle $A C B$ will be:

$$\begin{array}{rcl} \text{As hyp. 50.} & -1.698940 \\ \text{: radius} & -10.000000 \\ \text{: leg } A B, 40 & 1.602060 \\ \hline & 11.602060 \end{array}$$

Trigonometry

Making the leg $A B$ radius, the proportions will be:

To find the hypotenuse

$$\begin{array}{rcl} \text{As tang. } A C B, 56^{\circ} 45' & -10.183342 \\ \text{: leg } A B, 325 & 2.511883 \\ \text{: secant } A C B, 56^{\circ} 45' & 10.206979 \\ \text{: hyp. 388.6} & 12.372850 \\ \hline & 1.0143342 \\ & 12.372850 \\ & 1.0143342 \\ & 12.372850 \end{array}$$

To find the leg $B C$

$$\begin{array}{rcl} \text{As tang. } A C B, 56^{\circ} 45' & -10.183342 \\ \text{: leg } A B, 325 & 2.511883 \\ \text{: radius} & 10.000000 \\ \text{: leg } B C, 213.1 & 12.511883 \\ \hline & 10.183342 \\ & 12.511883 \\ & 10.183342 \\ & 12.511883 \end{array}$$

Making the hypotenuse radius the proportions will be;

To find the hypotenuse

$$\begin{array}{rcl} \text{As sine } B C A, 56^{\circ} 45' & -9.922355 \\ \text{: leg } A B, 325 & 2.511883 \\ \text{: radius} & 10.000000 \\ \text{: hyp. 388.6} & 12.511883 \\ & 9.922355 \\ & 12.511883 \\ & 9.922355 \\ & 12.511883 \end{array}$$

To find the leg $B C$

$$\begin{array}{rcl} \text{As sine } B C A, 56^{\circ} 45' & -9.922355 \\ \text{: leg } A B, 325 & 2.511883 \\ \text{: sine } B C A, 33^{\circ} 15' & 9.439013 \\ \text{: leg } B C, 213.1 & 12.250816 \\ & 9.439013 \\ & 12.250816 \\ & 9.439013 \\ & 12.250816 \end{array}$$

By Natural Sines.

To solve this case by natural sines, institute the following proportion:

To find the hypotenuse.

As the natural sine of the angle opposite

the given leg, is to the length of the leg,

so is unity, or 1, to the length of the hypotenuse.

On which is the same thing, divide the given leg, by the natural sine of its opposite angle and the quotient will be the hypotenuse.

Trigonometry

To find the other leg

As the natural sine of the angle opposite the given leg, is to the length of the given leg so is the natural sine of the angle opposite the other leg to the length of the other leg.

Example

Given leg 325. Nat. sine of $56^{\circ}45'$ the angle opposite the given leg 0.83629. Nat. sine of $33^{\circ}15'$ the angle opposite the other leg 0.54829.

As 0.83629 : 325 :: 0.54829 : x.

Or $0.83629 \times 0.54829 = 0.45866$.

Case III

The hypotenuse and one leg given to find the angles and the other leg. Fig. 44.

In the triangle ABC , given the hypotenuse 570 and the leg AB 40 to find the angles and leg BC .

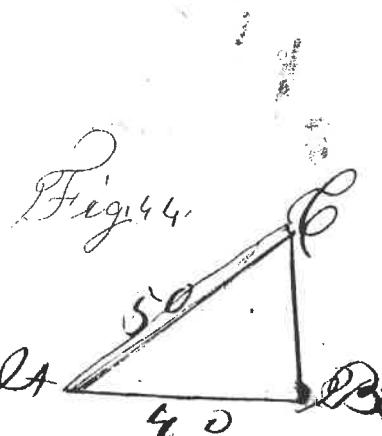


Fig. 44.

Trigonometry.

Making the hypotenuse radius, the proportion to find the angle $A C B$ will be:

$$\begin{array}{r} \text{As hyp. } 50. - 1.698880 \\ \text{; radius } - 10.000000 \\ \text{. leg } A B, 40 \quad 1.602060 \\ \hline 11.602060 \\ 1.698880 \\ \hline \text{ sine } A C B, 53^{\circ} 8' \quad 9.903090 \end{array}$$

The angle $A C B$ being $53^{\circ} 8'$ the other is consequently $36^{\circ} 52'$.

Making the leg $A B$ radius, the angle $B A C$ may be found by the following proportion

$$\begin{array}{r} \text{As. leg } A B, 40 \quad - 1.602060 \\ \text{; radius } - 10.000000 \\ \text{. hyp. } 50 \quad - 10.898880 \\ \hline 11.698880 \\ 1.602060 \\ \hline \text{ sec. } B A C 36^{\circ} 52' \quad 10.096810 \end{array}$$

The angles being found, the leg $B C$ may be found by either of the preceding cases. It is 30.

By Natural sines

The angle opposite the given leg may be found by the following proportion

As the hypotenuse is to unity or 1.00 is the given leg
To the nat. sine of its opp. angle.

Or which is the same thing, divide the given leg by the hypotenuse, and the quotient will be the natural sine.

Example

The leg $A B$ is divided by the hypotenuse & gives a quotient 0.8000 which looked in the table of natural sines the nearest corresponding number of degrees and minutes will be found to be $53^{\circ} 8'$ the angle $A C B$.

Trigonometry

$\frac{B}{\text{of the square root}}$

In this case the required leg may be found by the square root, without finding the angles; according to the following proportion;

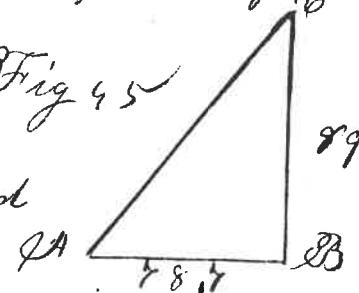
In every right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the two legs. Hence;

The square of the given leg being subtracted from the square of the hypotenuse, the remainder will be the square of the required leg.

As in the preceding example; the square of the leg AB 40 is 1600; this subtracted from the square of the hypotenuse 50 which is 2500 leaves 900, the square of the leg BC , the square root of which is 30, the length of the leg BC as found by logarithms.

Case IV.

Fig 45



The legs given to find the angles and the hypotenuse. Fig 45.

In the triangle ABC , given the leg AB 40, and the leg BC 30; to find the angles and the hypotenuse.

Making the leg AB radius, the proportion to find the angle BAC will be;

$$\begin{aligned} \text{As leg } BC, 30 &= 1.895945 \\ \text{radius} &= 10.000000 \\ \text{leg } BC, 30 &= \frac{1.895945}{10.000000} \end{aligned}$$

$$\tan BAC, 48^\circ 31' = \frac{1.895945}{10.000000}$$

The angle BAC is consequently $48^\circ 31'$.

Making the leg BC radius the proportion to find the angle BCA will be similar, with the obvious difference

Trigonometry.

The angles being found, the hypotenuse may be found by case 2. it is nearest 119.

By the square root.

In this case the hypotenuse may be found by the square root without finding the angles; according to the following proportion.

In every right angled triangle, the sum of the squares of the two legs is equal to the square of the hypotenuse.

In the above example, the square of $AB = 6193.69$
the square of $BC = 7921$; these added make 14114.69
the square root of which is nearest 119.

By Natural Sines.

The hypotenuse being found by the square root the angle may be found by nat. sines according to the preceding case.

Hyp. leg BC . Nat. sine

119) 89.00000174389

$$\begin{array}{r} 89.00000174389 \\ - 83.30000 \\ \hline 56.0 \\ - 47.6 \\ \hline 9.40 \\ - 8.33 \\ \hline 1.070 \\ - 0.950 \\ \hline 0.118 \\ - 0.1071 \\ \hline 0.0109 \end{array}$$

The nearest degrees and minutes corresponding the above nat. sine are $48^{\circ} 24'$; for the angle BAC . The difference between this and the angle as found by logarithms is occasioned by dividing by 119, which is not the exact length of the hypotenuse it being a fraction too much.

Trigonometry

Part II

Oblique Trigonometry

The solution of the two of Oblique Trigonometry depends on the following PROPOSITION.

IN ALL PLANE TRIANGLES, THE SIDES ARE IN PROPORTION TO EACH OTHER AS THE SINES OF THEIR OPPOSITE ANGLES. THAT IS, AS THE SINE OF ONE ANGLE IS TO ITS OPPOSITE SIDE, SO IS THE SINE OF ANOTHER ANGLE TO ITS OPPOSITE SIDE.

OR, AS ONE SIDE IS TO THE SINE OF ITS OPPOSITE ANGLE, SO IS ANOTHER SIDE TO THE SINE OF ITS OPPOSITE ANGLE.

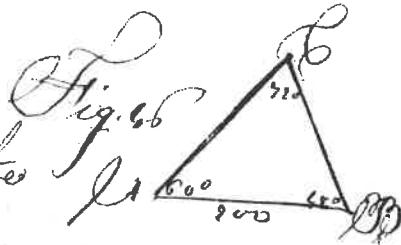
Case 1

The angles and one side given to find the other sides (Fig. 66)

In the triangle ABC , given the angle at $B 18^\circ$, the angle at $C 72^\circ$; consequently the angle at $A 60^\circ$; and the side $AC 200$, to find the sides AB and BC .

To find the side AB .

$$\begin{aligned} \text{I. sin } \angle CBA 72^\circ &= 9.778206 \\ \text{side } AC 200 &= 2.301030 \\ \text{II. sin } \angle BAC 60^\circ &= 9.841033 \\ &\hline 12.119103 \\ &\quad 9.934906 \\ \text{side } AB 156 &= \underline{\underline{2.772855}} \end{aligned}$$



To find the side BC

$$\begin{aligned} \text{I. sin } \angle CAB 60^\circ &= 9.935531 \\ \text{side } AC 200 &= 2.301030 \\ \text{II. sin } \angle BCA 72^\circ &= 9.778206 \\ &\hline 12.239507 \\ &\quad 9.934906 \\ \text{side } BC 182 &= \underline{\underline{2.260345}} \end{aligned}$$

By Natural sines

As the nat. sine of the angle opposite the given side is to the given side, so is the nat. sine of the angle opposite either of the required sides to the required side.

Given side $AC 200$; nat. sine of 72° ; its opposite angle 0.93115 ; nat. sine of $ACB 48^\circ 0.76334$; nat. sine of $BAC 60^\circ 0.86607$ thus

$$\begin{aligned} 0.93115 &= 0.86607 : 156 \\ 0.93115 &= 0.86607 : 182 \end{aligned}$$

Trigonometry

Case II

Two sides, and an angle opposite to one of them given, to find the other angles and side.

Fig. 47.

In the triangle ABC , given the side $AC = 40$, the side $BC = 200$, and the angle at $A = 60^\circ 30'$; to find the other angles and the side AB .

To find the angle ACB

As side $BC = 200 \dots 2.301030$

sin $BAC = 60^\circ 30' \dots 0.8660562$

side $AC = 40$

$$\begin{array}{r} 2.380211 \\ 2.240873 \\ \hline 0.14030 \\ \hline 2.938333 \end{array}$$

sin $ACB = 60^\circ 30'$ nearly 0.951823

The side AB will be found by Case I to be nearest 25.3.

By Natural Sines.

As the side opposite the given angle is to the nat. sine of that angle, so is the other given side to the nat. sine of its opposite angle.

One given side 200, nat. sine of $60^\circ 30'$, its opposite angle, over the other side 40.

$$200 : 0.8660562 : 40 : 0.890446 \approx 60^\circ 30'$$

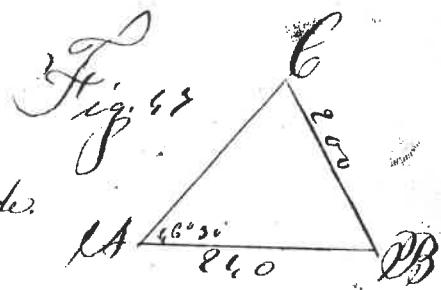


Fig. 47

Angle at A $60^\circ 30'$
C $60^\circ 30'$
 $\hline 120^\circ 00'$

Sum of the three angles 180°

Sum of two $60^\circ 30'$

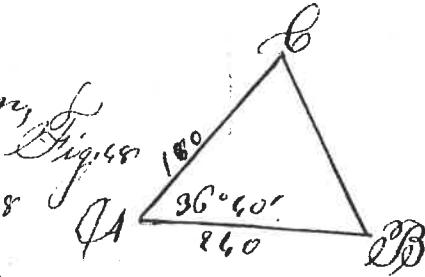
Angle at B 63

Trigonometry

Case III.

Two sides and their contained angle given,

to find the other angles and side.



The solution of this case depends on the following proposition
In every plane triangle, as the sum of any two sides is to
their difference, so is the tangent of half the sum of the
two opposite angles to the tangent of half the difference
between them.

Add this half difference to half sum of the angles
and you will have the greater angle, and subtract the half
difference from the half sum and you will the lesser
angle.

In triangle A B C, given side 240, side A C
180 and angle at A 36° 40' to find the other angles and
side A B

$$\begin{array}{r} \text{sum of the two sides} \ 240 \\ \text{A C} \ 180 \\ \hline \text{difference} \ 60 \end{array}$$

$$\begin{array}{r} \text{A B} \ 240 \\ \text{A C} \ 180 \\ \hline \text{difference} \ 60 \end{array}$$

The given angle B A C 36° 40', subtracted from 180° leaves
143° 20' the sum of the other two angles, the half of which is
71° 40'.

It is the sum of two sides, 420
their difference 60

∴ tangent half unknown ang 71° 40'

∴ tangent half difference 23° 20' nearly

The half of the two unknown angles

The half difference between them

>Add, gives the greater angle A B C

Subtract, gives the lesser angle A B C

The side B C may be found by case I of II.

$$\begin{array}{r} 2.623249 \\ - 1.339141 \\ \hline 1.284108 \\ - 1.252846 \\ \hline 0.031262 \\ - 0.031262 \\ \hline 0 \\ 29.80 \\ - 29.80 \\ \hline 0 \\ 95.00 \\ - 95.00 \\ \hline 0 \\ 58.23 \\ - 58.23 \\ \hline 0 \end{array}$$